



## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

## Ruptured spontaneous splenic artery aneurysm: A case report and review of the literature

Aisha Abdulrahman<sup>a</sup>, Alaa Shabkah<sup>a</sup>, Mazen Hassanain<sup>b</sup>, Murad Aljiffry<sup>a,\*</sup><sup>a</sup> Department of Surgery, College of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia<sup>b</sup> Department of Surgery, College of Medicine, King Saud University, Riyadh, Saudi Arabia

## ARTICLE INFO

## Article history:

Received 9 June 2014

Received in revised form 7 August 2014

Accepted 24 August 2014

Available online 2 September 2014

## Keywords:

Splenic artery

Aneurysm

Rupture

Spontaneous

Idiopathic

## ABSTRACT

**INTRODUCTION:** Splenic artery aneurysm is a rare condition, however, potentially fatal. The importance of splenic artery aneurysm lies in the risk for rupture and life threatening hemorrhage.**PRESENTATION OF CASE:** This is a case of a ruptured splenic artery aneurysm in a 58-year-old lady. She presented with hypovolemic shock and intra-peritoneal bleeding. Diagnosis was confirmed by CT angiography and she was managed by operative ligation of the aneurysm with splenectomy and distal pancreatectomy.**DISCUSSION:** The literature pointed the presence of some risk factors correlating to the development of splenic artery aneurysm. In this article we discuss a rare case of spontaneous (idiopathic) splenic artery aneurysm and review the literature of this challenging surgical condition.**CONCLUSION:** Splenic artery aneurysm needs prompt diagnosis and management to achieve a favorable outcome, high index of suspicion is needed to make the diagnosis in the absence of known risk factors.© 2014 The Authors. Published by Elsevier Ltd. on behalf of Surgical Associates Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/3.0/>).

## 1. Introduction

Splenic artery aneurysm is a rare condition with a prevalence of 1%.<sup>1</sup> It accounts for about 60% of all splanchnic arterial aneurysms. It only follows aortic and iliac arteries aneurysms as the third most common intra-abdominal aneurysm.<sup>1</sup> The significance of splenic artery aneurysm lies in the potential risk for rupture and life threatening hemorrhage which occurs in 10% of cases with a mortality rate of 10–25% in non-pregnant patient and up to 70% during pregnancy.<sup>2</sup>

A true aneurysm is different from pseudoaneurysms. In a true aneurysms, all the layers of the vessel are intact with a thinned and dilated wall. On the other hand, a pseudoaneurysm or false aneurysm results from a tear in the vessel wall with subsequent formation of a peri-arterial hematoma and is usually secondary to a local inflammatory process such as pancreatitis.<sup>3</sup>

To date the literature pointed the presence of some risk factors correlating to the development of splenic artery aneurysm such as fibromuscular dysplasia, collagen vascular diseases, female gender, history of multiple pregnancies and portal hypertension.<sup>4</sup> We describe a case of spontaneous (idiopathic) splenic artery aneurysm

whom presented uniquely without any previously known risk factor.

## 2. Presentation of case

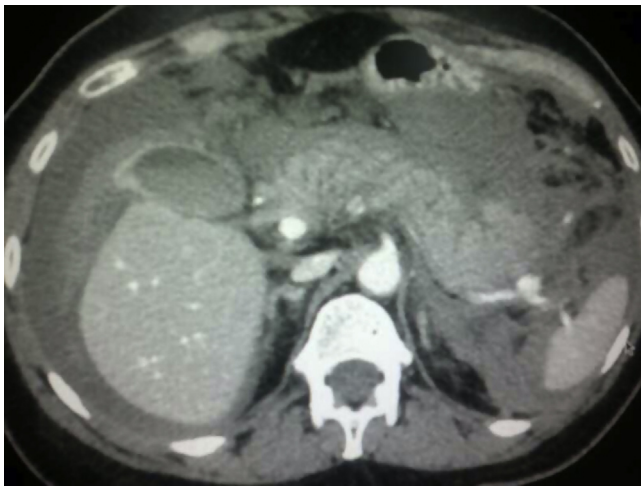
58-year-old female, presented to ER compiling of epigastric abdominal pain and nausea for one day. There were no associated symptoms nor there was a history of previous similar episodes. Her past medical history includes cavernous sinus venous thrombosis for which she was on lifelong warfarin anticoagulation and she did not have any previous surgeries. Initial physical examination was unremarkable. Her initial lab test showed a hemoglobin of 13.6 g/dl and INR of 6.6 IU. Abdominal ultrasound did not show any obvious abnormality. The patient was admitted for a possible upper GI endoscopy if symptoms did not resolve after correction of the coagulopathy. Twelve hours following admission the patient complained that her pain suddenly became severe. On examination her heart rate became 110/min and the blood pressure dropped to 90/50 mmHg. Her abdomen became distended with mild general tenderness and her repeated hemoglobin was 6.9 g/dl. Patient was resuscitated and stabilized then shifted to radiology suite. CT angiogram showed large amount of free intra peritoneal fluid and a splenic artery aneurysm with intravenous contrast extravasation consisting of intra peritoneal hemorrhage (Figs. 1 and 2).

The patient was appropriately resuscitated with blood and plasma transfusions and booked for an emergency exploration.

\* Corresponding author at: Department of Surgery, College of Medicine, King Abdulaziz University Hospital, P.O. Box 80215, Jeddah 21589, Saudi Arabia.

Tel.: +966 012 6401000x18209; fax: +966 012 6408347.

E-mail address: [dr.aljiffry@gmail.com](mailto:dr.aljiffry@gmail.com) (M. Aljiffry).

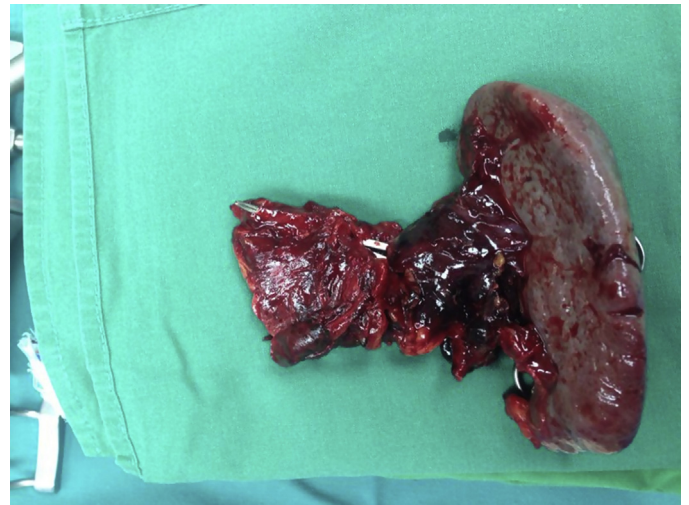


**Fig. 1.** CT abdomen showing intra peritoneal hematoma.



**Fig. 2.** CT abdomen showing splenic artery aneurysm and contrast extravasation.

In the operating room a midline laparotomy incision was performed. Upon entering the peritoneal cavity a moderate amount of blood and clots were encountered. After proper exposure, a large hematoma was seen in the lesser sac bulging through the



**Fig. 3.** Excised specimen showing the splenic artery (artery clamp through) and the site of the aneurysm rupturing into the pancreas close to the hilum.

gastro-colic omentum. The supra-celiac aorta was identified by dissecting through the gastro-hepatic ligament to assure the availability of vascular control. Exploration of the lesser sac hematoma revealed a ruptured aneurysm involving the distal part of the splenic artery close to the hilum of the spleen, with a total amount of evacuated blood of 3 L. The splenic artery was ligated proximally, followed by a splenectomy with distal pancreatectomy to excise the aneurysm that was inseparable from the pancreatic tail (Fig. 3). As the patient was in hypovolemic shock a damage control approach was taken to expedite the transfer of the patient to the ICU for hemodynamic management and overall support. We believed that a splenectomy was the procedure of choice to accomplish the control of the bleeding in this patient, rather than a splenic tissue preserving procedure. The patient had uneventful postoperative course and discharged home on the 7th postoperative day. The histopathology report confirmed the diagnosis of a true splenic artery aneurysm.

### 3. Discussion

Splenic artery aneurysm was first described by Beaussier in 1770.<sup>5</sup> The incidence of splenic artery aneurysm in large autopsy series found to be between 0.01% and 0.2%. The incidence

**Table 1**

Summary of all reported cases of spontaneous (idiopathic) splenic artery aneurysm.

Year	Author	Age (years)	Sex	Presentation	Method of diagnosis	Procedure	Outcome
1990	Lie et al. <sup>16</sup>	71	M	Abdominal pain/UGIB	Angiography	Distal pancreatectomy	Survived
1994	Willis et al. <sup>17</sup>	86	F	UGIB	Not reported	Ligation of the aneurysm	Survived
2000	Deshpand et al. <sup>18</sup>	62	F	Abdominal pain	Intra-operative	Distal pancreatectomy	Survived
		27	M	Shock	Intra-operative	Splenectomy	Died
2001	Jamsheer et al. <sup>19</sup>	30	M	Shock	CT scan	Splenectomy	Survived
2005	Tsokos et al. <sup>20</sup>	33	M	Shock	Autopsy	Not done	Died
2006	Afridi et al. <sup>21</sup>	18	F	Abdominal pain/shock	Intra-operative	Splenectomy	Survived
2007	Mattick <sup>22</sup>	47	M	Abdominal pain/shock	Intra-operative	Splenectomy	Survived
2009	Betal et al. <sup>23</sup>	58	M	Epigastric pain/shock	CT scan	Splenectomy	Survived
2009	Zubaidi <sup>24</sup>	42	F	LUQ pain/hematemesis	CT scan	Splenectomy/embolization of proximal aneurysm	Survived
2009	Sezgin et al. <sup>11</sup>	22	F	LUQ pain	Intra-operative	splenectomy	Survived
2009	Ousadden et al. <sup>14</sup>	36	F	hematemesis	Intra-operative	Splenectomy	Survived
2013	Katirci et al. <sup>25</sup>	46	F	LUQ pain	CT scan	Splenectomy	Survived
2014	Oakley et al. <sup>26</sup>	33	M	Generalized body pain/shock	Intra-operative	Splenectomy	Survived
		48	M	Abdominal pain/shock	Intra-operative	Splenectomy	Survived

increases to 10% in patients who are older than 60 years and in patients with portal hypertension.<sup>6</sup> Splenic artery aneurysm is more common in females, with a female-to-male ratio of 4:1.<sup>7</sup> Although the pathogenesis is still not clear, many contributing factors have been described, which were found to play a role in the development of splenic artery aneurysm including medial fibrodysplasia, pregnancy, portal hypertension, splenomegaly, liver cirrhosis, orthotopic liver transplantation, degenerative atherosclerosis, pancreatic pseudocyst, polyarteritis nodosa, vasculitis and congenital anomalies affecting the arteries of the foregut.<sup>8–10</sup> None of these factors was identified in our case with only 15 similar cases of spontaneous (idiopathic) splenic artery aneurysm were reported in the literature over the last 30 years (Table 1).

Patients with splenic artery aneurysm are usually asymptomatic, only 20% of them have symptoms such as abdominal pain, chest pain and most are diagnosed incidentally.<sup>11</sup>

Splenic artery aneurysm can be complicated by rupture resulting in hypovolemic shock, which could be fatal if not treated properly. It can rupture freely in the peritoneal cavity, in the gastrointestinal tract causing GI hemorrhage or eroding into surrounding structures such as, the splenic vein resulting in splenic arteriovenous fistula.<sup>12</sup> A high blood flow through the splenic arteriovenous fistula can rarely lead to mesenteric steal syndrome, which can result in non-transmural small bowel ischemia.<sup>13</sup>

The diagnosis of splenic artery aneurysm can be made by Ultrasound, pulsed Doppler, CT, MRI and abdominal aortic arteriography, which is the gold standard.<sup>14</sup> It is reported that up to 74–87% of the aneurysms are located in the distal third of the splenic artery, 22% in the middle third and the remaining in the proximal third.<sup>15</sup> Indications of treatment include symptoms, aneurysms >2 cm, pregnancy and patients having major upper abdominal surgery.<sup>3</sup>

The therapeutic options are either surgical or endovascular treatment.

Surgical options includes; excision, ligation or revascularization, with or without splenectomy. This could be achieved by either an open or a minimally invasive approach depending on the expertise.<sup>8</sup> The endovascular treatment is usually considered for those who are not candidate for surgery and those in elective settings. It includes different techniques such as coil embolization, placement of covered stents, plug deployment, gluing, and injection of endoluminal thrombin, polyvinyl alcohol, particles, or gelfoam.<sup>3</sup> However, surgical intervention is considered the conventional option of treatment in most centers especially in case of rupture.

#### 4. Conclusion

Splenic artery aneurysm is a challenging diagnosis that needs to be considered in patients presenting with abdominal pain and signs of hypovolemia regardless the presence of an identifiable risk factors. Prompt treatment is detrimental to patient survival.

#### Conflict of interest

None.

#### Funding

None.

#### Ethical approval

The authors confirm that a written informed consent was obtained from the patient for publication of this case report and accompanying images.

#### Author contribution

Aisha Abdulrahman (senior surgical resident): literature review and summarized all previous similar cases, wrote part of introduction and discussion, photography. Alaa Shabkiah (surgical intern): wrote the case details and clinical course, improved the introduction and managed the reference list. Mazen Hassanain (assistant professor and consultant HPB and transplant surgeon): reviewed the whole manuscript, offered critiques and improved the discussion. Murad M. Aljiffry (assistant professor and consultant HPB and transplant surgeon): surgeon who performed the operation, reviewed the case, wrote part of discussion and introduction and submission process.

#### References

- Al-Habbal Y, Christophi C, Muralidharan V. Aneurysms of the splenic artery – a review. *Surg J R Coll Surg Edinb Irel* 2010;**8**(4):223–31.
- Manian U, Badri H, Coyne P, Nice C, Ashour H, Bhattacharya V. Endovascular treatment of a ruptured splenic artery aneurysm using amplatzer (R) vascular plug. *Int J Biomed Sci: IJBS* 2009;**5**(1):81–4.
- Cordova AC, Sumpio BE. Visceral artery aneurysms and pseudoaneurysms—should they all be managed by endovascular techniques? *Ann Vasc Dis* 2013;**6**(4):687–93.
- Mees B, Robinson D, Verhagen H, Chuen J. Non-aortic aneurysms – natural history and recommendations for referral and treatment. *Austr Fam Physician* 2013;**42**(6):370–4.
- Lynch MJ, Woodford NW. Rupture of a splenic artery aneurysm during pregnancy with maternal and foetal death: a case report. *Med Sci Law* 2008;**48**(4):342–5.
- Reardon PR, Otah E, Craig ES, Matthews BD, Reardon MJ. Laparoscopic resection of splenic artery aneurysms. *Surg Endosc* 2005;**19**(4):488–93.
- Dave SP, Reis ED, Hossain A, Taub PJ, Kerstein MD, Hollier LH. Splenic artery aneurysm in the 1990s. *Ann Vasc Surg* 2000;**14**(3):223–9.
- Kim Y, Johna S. Laparoscopic excision of splenic artery aneurysm. *J Soc Laparoendosc Surg/Soc Laparoendosc Surg: JSLS* 2013;**17**(1):132–4.
- Annicchiarico BE, Avolio AW, Caracciolo G, Barbaro B, Di Stasi C, Agnes S, et al. Late development of splenic artery aneurysm after orthotopic liver transplantation: a case report. *Transplant Proc* 2009;**41**(4):1383–5.
- Ailawadi G, Cowles RA, Stanley JC, Eliason JL, Williams DM, Colletti LM, et al. Common celiacomesenteric trunk: aneurysmal and occlusive disease. *J Vasc Surg* 2004;**40**(5):1040–3.
- Sarikaya S, Ekci B, Aktas C, Cetin A, Ay D, Demirag A. A rare clinic presentation of abdominal pain: rupture of splenic artery aneurysm: a case report. *Cases J* 2009;**2**:148.
- Siablis D, Papathanassiou ZG, Karnabatidis D, Christeas N, Katsanos K, Vagianos C. Splenic arteriovenous fistula and sudden onset of portal hypertension as complications of a ruptured splenic artery aneurysm: successful treatment with transcatheter arterial embolization. A case study and review of the literature. *World J Gastroenterol: WJG* 2006;**12**(26):4264–6.
- Sendra F, Safran DB, McGee G. A rare complication of splenic artery aneurysm. Mesenteric steal syndrome. *Arch Surg (Chicago, IL: 1960)* 1995;**130**(6):669–72.
- Ousadden A, Ibmajdoub KH, Elboudhaddouti H, Mazaz K, Aittaleb K. Intragastric rupture of a splenic artery aneurysm – a case report. *Cases J* 2009;**2**:202.
- Yadav R, Tiwari MK, Mathur RM, Verma AK. Unusually giant splenic artery and vein aneurysm with arteriovenous fistula with hypersplenism in a nulliparous woman. *Interact Cardiovasc Thorac Surg* 2009;**8**(3):384–6.
- Lie M, Ertresvag K, Skjennald A. Rupture of a splenic artery aneurysm into the pancreatic duct. Case report. *Acta Chirug Scand* 1990;**156**(5):411–3.
- Wagner WH, Cossman DV, Treiman RL, Foran RF, Levin PM, Cohen JL. Hemosuccus pancreaticus from intraductal rupture of a primary splenic artery aneurysm. *J Vasc Surg* 1994;**19**(1):158–64.
- Deshpande AA, Kulkarni VM, Rege S, Dalvi AN, Hardikar JV. Ruptured true aneurysm of the splenic artery: an unusual cause of haemoperitoneum. *J Postgrad Med* 2000;**46**(3):191–2.
- Jamsheer NS, Malik N. Ruptured splenic artery aneurysm. *Ann Saudi Med* 2001;**21**(5–6):340–1.
- Tsokos M, Nolting RO, Lockemann U. Sudden, unexpected death due to splenic artery aneurysm rupture. *Am J Forens Med Pathol* 2005;**26**(1):83–5.
- Afridi Z, Khan BA, Haq RNU, Ullah S, Hassan A, Afridi KK, et al. Rupture splenic artery aneurysm. *J Postgrad Med Inst* 2006;**20**(4):407–9.
- Mattick A, Gawthorpe I. Splenic artery aneurysm rupture: case report of this uncommon presentation. *Emerg Med J: EMJ* 2007;**24**(12):863.

23. Betal D, Khangura JS, Swan PJ, Mehmet V. Spontaneous ruptured splenic artery aneurysm: a case report. *Cases J* 2009;**2**: 7150.
24. Zubaidi A. Rupture of multiple splenic artery aneurysms: a common presentation of a rare disease with a review of literature. *Saudi J Gastroenterol: Off J Saudi Gastroenterol Assoc* 2009;**15**(1):55–8.
25. Katirci Y, Karamercan MA, Ramadan H, Baran N, Aksoy O, Coskun F. Spontaneous ruptured splenic artery aneurysm: a case report. *Hong Kong J Emerg Med* 2013;**20**(4):248.
26. Oakley E, Ho JD, Johnson V, Vancamp J, Melson T, Hick JL. Splenic artery aneurysm: an important cause of hemoperitoneum and shock. *J Emerg Med* 2014;**46**(3):e65–7.

#### Open Access

This article is published Open Access at [scimedirect.com](http://scimedirect.com). It is distributed under the [IJSCR Supplemental terms and conditions](#), which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.